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ABSTRACT

This study drew on data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 to examine whether children made gains in general knowledge over the summer following their first year of kindergarten, whether general knowledge gains were similar for all children, and whether participation in certain types of summer activities related to general summer knowledge gains. The analyses in this study used a subset of 3,718 children from the larger study who were first-time kindergartners in Fall 1998, who were administered a general knowledge assessment in English in both Spring and Fall 1999, and whose parents completed an interview in Fall 1999. Findings revealed that children gained an average of 3.2 points on general knowledge assessments over the summer. Children who repeated kindergarten in 1999-2000 showed smaller summer gains than children who moved to first grade. Higher family SES and lower general knowledge status at end of kindergarten were associated with greater summer gains. White children and those from high-SES groups had more involvement in all types of summer activities than some minority children and those from the lowest SES. Associations between summer experiences and general knowledge gains were detected only for children from the lowest general knowledge group after controlling for other factors in the model. For this group, greater exposure to literacy activities was related to additional summer knowledge gains. Low-knowledge children participating in summer school, camps, or day care gained more than low-knowledge children not attending summer education programs. For children from middle and high general knowledge groups, summer activities were not associated with summer general knowledge gains. (Contains 12 references.) (KB)

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The world around them: The relationship between kindergartners' summertime experiences and their general knowledge

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Perspective

Young children's experiences in kindergarten and first grade play a central role in their early cognitive and social development. One key area of development is children's knowledge of the world around them (or "general knowledge"), including understanding of the physical, social, and biological worlds. In school, general knowledge can be conceptualized as including social studies and science as well as the humanities and arts. The former two (social studies and science) have been identified as two key curricula foci (see Huttenlocher & Levine 1995). General knowledge in these terms reflects basic concepts and skills such as understanding the seasons, knowing about other cultures and being able to classify and predict. In the particular study examined here, general knowledge was measured by children's understanding of science and social studies content. General knowledge topics were drawn from curriculum expert review and textbook coverage, but also, especially in the early school years, were based on children's experiences with their environment (NCES 2001).

General knowledge of the physical, social, and biological worlds moves beyond simple social studies or science facts; it also involves the ability to interpret information and draw conclusions. In this way, general knowledge may also help to facilitate success in other academic areas such as reading and mathematics. For example, children's ability to comprehend a story or communicate with others may depend on the prior knowledge they have to put the situation into context. Also, several science skills overlap with mathematics (e.g., estimating, classifying). Growth in general knowledge strengthens this prior knowledge, facilitating success in other academic areas as well as in overall school performance. In fact, children's general knowledge (as defined above) correlates moderately with their reading and mathematics knowledge (West, Denton, and Germino Hausken 2000).

Child development literature has long cited that children learn through interacting with others (Bandura 1986) and thrive when they can actively participate in and construct their knowledge (Ginsburg and Opper 1988). Thus, in addition to learning opportunities inside the classroom, children's activities outside of school can provide them with educational experiences that contribute to their development and academic success. For general knowledge in particular, much of what young children learn about their world takes place outside of the classroom. Findings from a study by Reaney, Denton, and West (2002) show that children's participation in more family outings, such as visiting museums, libraries, zoos, and aquariums or attending plays, concerts, or sporting events is positively related to children's general knowledge status in the spring of kindergarten. These types of activities may foster learning for young children because they provide opportunities for children to participate in new situations.

The summer represents a unique opportunity to support children's development and learning through such activities. In the summer months following kindergarten, children have more time available to participate in many kinds of activities, both alone and with their families. These include vacations, use of community resources such as libraries and museums, participation in enrichment activities (e.g., team sports), and attendance in summer school or camp programs. Little research exists, however, on young children's participation in these types of activities over the summer months, and on whether such experiences are related to children's subsequent general knowledge achievement. Most research tends to focus on summer learning or loss in mathematics and reading for children in relation to their social and demographic

backgrounds (Cooper, Nye, Charlton, Lindsay, and Greathouse 1996; Entwisle and Alexander 1992; Bryk and Raudenbush 1988). However, Heyns (1987) found some relationships among overall achievement gains and children's participation in summer camps, summer school, and family vacations.

Recent studies using data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) have explored the relationships between summer activities and young children's gains in reading and mathematics. Downey and Broh (2002) found that in the summertime, kindergartners from the lowest socioeconomic (SES) backgrounds lost ground in reading skills, while those in the highest SES level made modest gains. They also found that children who went on summer vacation trips made greater gains in reading than children who did not go on summer vacations, after controlling for children's backgrounds. Lee et al. (2002) examined the degree of children's gains in reading and mathematics over the summer following kindergarten and found that low-SES children had smaller gains in reading and mathematics than high-SES children. In addition, they found that children's exposure to certain types of literacy activities was positively related to summer gains in reading and that children's gains in mathematics over the summer were positively related to the number of community resources (e.g., museums, zoos/aquariums) they visited in the summer and to their access to and use of computers in the summer for educational purposes. However, neither of these studies examined the association of children's background characteristics and their summer activities with their gains in general knowledge in the summer after kindergarten.

The purpose of this paper is two-fold. First, the paper examines the degree of summer learning or loss in young children's general knowledge in the summer following their first year in kindergarten, and whether change in general knowledge achievement over the summer is related to children's sex, race/ethnicity, family socioeconomic status (SES), and primary home language. Summer learning and loss are also examined relative to children's general knowledge status in the spring of kindergarten and their kindergarten retention status in the 1999-2000 school year. Second, this paper describes the prevalence of children's participation in certain summer activities and examines whether participation is related to the general knowledge gains that children make in the summer following kindergarten.

This paper examines the following two research questions:

1. *Do children make gains in general knowledge over the summer following their first year of kindergarten? Are general knowledge gains similar for all children?*

2. *What activities do children participate in during the summer following kindergarten? Is participation in certain types of summer activities related to general knowledge gains over the summer?*

Method

Data for this paper come from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), sponsored by the U.S. Department of Education's National Center for Education Statistics. The ECLS-K captures information on children and their families, teachers, and schools. Children's physical, cognitive, and socioemotional development are considered across multiple contexts, including home, school, and community. A nationally representative sample of 22,782 children enrolled in 1,277 kindergarten programs during the 1998-99 school year were chosen to participate in the study. In the spring of 1999, kindergartners participating in the ECLS-K were administered a two-stage assessment in the areas of reading, mathematics, and general knowledge[1]. Each assessment was scored using Item

[1] Detailed information on the ECLS-K cognitive assessments is included in the *ECLS-K Base Year User's Manual* (NCES 2001-029).

Response Theory (IRT), so that scores across time could be measured on a common scale. In the fall of 1999, a 30 percent subsample of these same children was administered the ECLS-K assessments in order to measure changes in the three subject areas over the summer prior to first grade. In addition, computer-assisted telephone interviews were conducted with the children's parents to collect information on children's summer activities. This paper is based on the data collected from the children in the spring and fall of 1999 and their parents in the fall of 1999.

The analyses in this paper use the subset of 3,718 children who 1) were first-time kindergartners in fall of 1998, 2) were administered the general knowledge assessment in English in both the spring of 1999 (kindergarten) and the fall of 1999 (first grade), and 3) whose parents completed an interview in fall of 1999.[2] Table 1 provides a description of the children in this paper compared with the full ECLS-K sample of first-time kindergartners. The sample for this paper differs from the full ECLS-K sample of first-time kindergartners in that those who were not proficient in English[3] at the time of the assessments were excluded from all analyses. This difference in the two samples can have an effect on the racial/ethnic, poverty, and home language distribution of the cases used in analyses. When appropriately weighted[4], the sample is representative of children who began kindergarten in the fall of 1998. All reported results are significant at the .05 level after Bonferroni adjustments for multiple comparsions.

Analysis Variables

Information in this paper was collected through child assessments and parent interviews. Below is a brief description of the measures and characteristics used from these information sources. More detailed information on the measures can be found in the *Early Childhood Longitudinal Study, Kindergarten Class of 1998–99: Base-Year Public-use Data Files User's Manual* (NCES 2001).

General knowledge IRT-scale score. Children were administered an untimed, individualized 2-stage assessment in general knowledge using computer adaptive testing in the spring of kindergarten and the fall of first grade. Children's performance on a routing test (stage 1) was used to determine which second-stage test was most appropriate in difficulty. The ECLS-K general knowledge assessment had two second-stage skill levels. IRT-scale scores were calculated based on children's performance on the routing and second-stage tests. The general knowledge domain consisted of essentially science and social studies items, tapping children's knowledge of the world in general. Science items assessed children's conceptual understanding and scientific investigation skills (e.g., drawing and testing inferences). Social studies items included history, culture, and government. The same assessment was used in both the spring and fall of 1999. The ECLS-K general knowledge assessment was designed in a way that ceiling effects were not an issue in the fall of first grade. The possible range of values for the general knowledge assessment was 0 to 51; however, children's general knowledge scores ranged from 7.9 – 47.4 in the spring of kindergarten (mean of 27.8) and from 7.8 – 48.6 in the fall of first grade (mean of 31.0).

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[2]Two percent (59 cases) of the ECLS-K sample were excluded from the analyses in this paper because they attended year-round schools in 1999-2000.

[3]English proficiency was assessed in the spring and fall of 1999 using the Oral Language Development Scale (OLDS). About 5 percent of the children with valid C23CW0 weights did not have the basic English language skills required to participate in the ECLS-K assessment in the spring of kindergarten. Of those 5 percent, 93 percent were Hispanic and 6 percent were Asian/Pacific Islander children.

[4]All analyses in this paper are conducted using the ECLS-K C23CW0 longitudinal child assessment weight unless otherwise noted.

Child characteristics. Children's general knowledge gains over the summer and their participation in summer activities were examined in relation to the following characteristics:

- Child's sex (male, female)

- Child's race/ethnicity (White, non-Hispanic, Black, non-Hispanic, Hispanic, Asian/Pacific Islander, Other, non-Hispanic)[5]

- Family socioeconomic status (SES) in kindergarten (lowest 20 percent, middle 60 percent, highest 20 percent). This composite in the ECLS-K database is derived from the following variables: mother/female guardian's education level, father/male guardian's education level, mother/female guardian's occupation, father/male guardian's occupation, and household income. For this paper, the family SES distribution was collapsed into three groups representing children in the lowest 20 percent, the middle 60 percent, and the highest 20 percent of the range of SES values in order to focus on the gains made by the most and least advantaged groups relative to the average SES group.

- Family's primary home language in kindergarten (English, non-English)

- Urbanicity (urban/city center, suburban/urban fringe, rural/small town). Urbanicity reflects the location of the child's school during the kindergarten year.

- Kindergarten retention status in 1999-2000 (repeating kindergarten, promoted to first grade). The majority of the sample moved on to first grade in the 1999-2000 year. However, about 4 percent of the kindergartners were retained in kindergarten following the 1998-99 school year.

- Spring-kindergarten general knowledge status (low group, middle group, high group). For this paper, children were categorized into three equally sized groups based on their spring-kindergarten general knowledge IRT-scale score. A categorical variable was created for this measure since the relationship between spring kindergarten general knowledge status and gains in general knowledge over the summer was non-linear.

Elapsed time variables. Previous research on summer learning based on the ECLS-K has identified the importance of taking into consideration the differences between the assessment dates and the school year summer vacation dates, so that "out-of-school" time is not confounded with "in-school" time (Downey and Broh 2002; Lee et al. 2002). It was not possible to assess all 3,718 ECLS-K children on the same day in the spring and fall of 1999, thus the elapsed time between assessments and the start and end of the school year were included in the regression analyses in this paper as control variables. The ECLS-K data file provides the dates of each assessment and also includes information from children's parents and schools on the school year start and end dates. The primary source for the school start and end dates came from the schools through a Student Record Abstract (SRA) form[6]. However, due to the amount of missing data on school year start and end dates from this source, a composite variable was created for this paper. If SRA data were missing for these variables, data from parent reports in the fall of 1999 were used.

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[5]White refers to White, non-Hispanic, Black refers to Black, non-Hispanic, and Other refers to Other, non-Hispanic (i.e., American Indian, Alaska Native, or multiracial) children for the remainder of the paper.

[6] Data from the SRA are based on the 1999-2000 school year, while parent reports are based on the end of the 1998–99 school year and the start of the 1999–2000 school year. Although the SRA data on school end dates come from a later school year, it is anticipated that school year start and end dates do not vary much from year to year. Also, the SRA data appeared to be a more reliable source of information based on the range of responses provided from both sources.

Based on the dates of assessment and the school year start and end dates, three elapsed time variables were created:

- End of kindergarten elapsed time, in days (End of kindergarten date – spring 1999 assessment date). This variable describes the number of days that elapsed between the time of the spring-kindergarten assessments and the end of the kindergarten school year. The mean value for this variable was 32 days (standard deviation = 16.7).

- Summer elapsed time, in days (Start of first grade date[7] – End of kindergarten date), centered on the mean number of days of summer vacation (79.6 days). This variable describes the number of days less than or greater than the average number of days that school was out of session. The mean value for this variable was 0 days (standard deviation = 9.3).

- Start of first grade elapsed time, in days (Fall 1999 assessment date – start of first grade date). This variable describes the number of days that elapsed between the start of the first-grade school year and the date of the first-grade assessments. The mean value for this variable was 46 days (standard deviation = 17.0).

By centering the summer vacation days variable on the mean number of days between the end of kindergarten and the start of first grade, it is possible to examine the mean gain in general knowledge over the average summer vacation, after controlling for the in-school time spent at the end of kindergarten after the ECLS-K spring assessment and the time spent in first grade before the ECLS-K fall assessment.

Summer activities. Children's parents were asked many questions in the fall of first grade about the summer activities in which their children participated. This paper analyzes four different types of summer activities:

Vacation experiences. Data were collected on the number of days children spent on a summer vacation or trip with family members or relatives.

Use of community resources. Parents were asked if the child had used any of ten community resources over the summertime:

- Public library
- Bookstore
- Art, science, or discovery museums
- Historical site
- Zoo or aquarium
- Amusement park
- Beaches, lakes, or rivers
- Plays or concerts
- National or state park
- Large city (other than where the child lives)

Parents were asked additional questions about their child's use of a public library and bookstore. They were asked the number of times their child visited a public library or bookstore and whether their child had attended a story hour at each place.

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[7] Ninety-six percent of the children of the first-time kindergartners in the sample progressed to first grade in the fall of 1999. Thus, this paper refers to the start of the 1999-2000 school year as the start of first grade, even though some of the sampled children were repeating kindergarten at this time point.

Enrichment activities. Parents were asked if the child participated in six different enrichment activities over the summer that were not sponsored by the school or part of summer camp or day care. The summer enrichment activities were:

- Music lessons
- Dance lessons
- Swimming lessons or swim team
- Team sports or lessons (e.g., soccer, basketball, t-ball)
- Individual sports or lessons (e.g., tae kwan do, golf)
- Scouting

Attendance at a summer education program. Parents were also asked if the child attended or participated in different education and care programs, including:

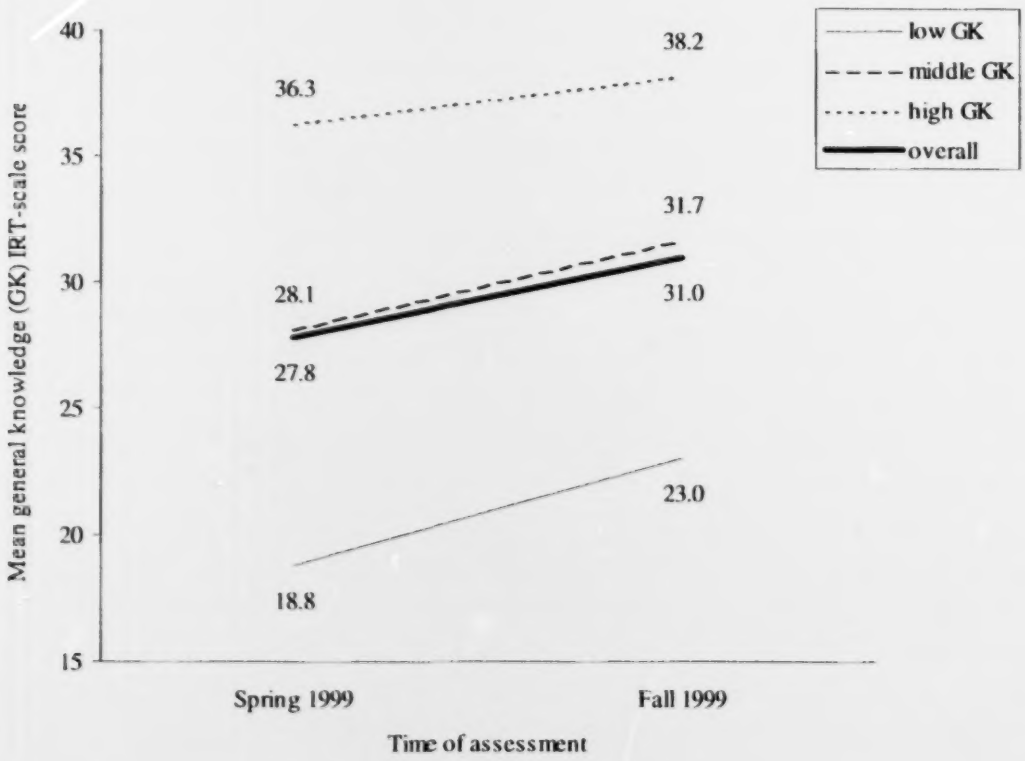
- Summer school or school enrichment programs
- Summer camp
- Day care (center-based care)

Findings

Do children make gains in general knowledge over the summer following their first year of kindergarten? Are general knowledge gains similar for all children?

Over the kindergarten year, children gained an average of 5.2 points (SD = 4.03) on the ECLS-K general knowledge assessments. For this paper, children's summer gains in general knowledge were calculated by subtracting their Fall 1999 general knowledge IRT scale scores from their Spring 1999 IRT scale scores. On average, children in the overall sample gained 3.2 points in general knowledge from the end of kindergarten to the beginning of first grade (figure 1). Children's summer gains in general knowledge ranged from –19 points to 22 points (SD = 3.83).

Figure 1. Mean general knowledge IRT-scale scores, overall and by children's spring-kindergarten general knowledge (GK): Spring and fall 1999



NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English. General knowledge groups are three equally sized groups (low, middle, high) based on children's performance on the spring 1999 general knowledge assessment.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Spring and Fall 1999.

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Exploratory linear regression analyses were used to examine whether certain child, family, and school characteristics were significantly related to general knowledge gains over the summer prior to first grade, after controlling for the elapsed time, in days, for each of the three time periods (end of kindergarten, summer, start of first grade).[8] In the initial regression model (table 2, model 1), children's general knowledge gains were regressed on each of the three time periods, to identify the mean gain score for children after controlling for the length of time that they were in and out of school. The significant intercept term in this model indicated that children made an average gain of 1.3 points in general knowledge over the summer assuming 1) no elapsed time between the spring assessment and end of the kindergarten year; 2) an average summer vacation time of 79.6 days; and 3) no elapsed time between the start of the school year and the fall-first grade assessment. Children who were in school for more days between the two assessment dates demonstrated higher general knowledge gains than children whose assessment dates were closer to the end of kindergarten and start of first grade. On the other hand, the number of out-of-school days (summer vacation time) was not related to general knowledge gains.

In the second descriptive regression model (table 2, model 2), children's sex, race/ethnicity, kindergarten retention status in the 1999-2000 school year, family socioeconomic status (SES), primary home language, and school urbanicity were added as predictors to the initial regression model. In this model, kindergarten retention status was the only significant predictor of summer gains after controlling for elapsed time. Children who were moved on to first grade in the fall of 1999 gained 0.83 points (effect size = .22 SD) more in general knowledge over the summer than children who repeated kindergarten.

For the third regression model (table 2, model 3), children's spring-kindergarten general knowledge IRT scores were added to the set of variables in the second model to examine whether children at different general knowledge achievement status levels in the spring of kindergarten made similar gains in general knowledge over the summer. For this analysis, children were grouped into three equal groups (low, middle, and high achievement) based on their spring-kindergarten general knowledge IRT score. In this model, the summer gains that children made in general knowledge were related to their sex, family SES, kindergarten retention status, spring-kindergarten general knowledge achievement status and also to the interaction between their spring achievement status and family SES, after controlling for other factors.

Results from the third model indicated that boys made slightly greater gains in general knowledge over the summer, gaining about a third of a point more than girls between the two assessments (effect size = .09 SD). As found in the second model, children who repeated kindergarten in 1999-2000 demonstrated gains in general knowledge over the summer that were, on average, less than children who moved on to first grade (in this case 1.3 points less with an effect size of 0.34 SD). Children's racial/ethnic background and primary home language were not significantly related to summer gains.

When examining children's gains relative to their SES, it was found that it was important to take into account their general knowledge achievement status in the spring of kindergarten, as the two variables had a significant interaction as well as main effects in their relationship with summer general knowledge gains (figure 2). For instance, children from the high SES and high general knowledge group had a mean gain of about one-quarter of a point in the summer (effect size = .07 SD), after controlling for other factors, based on the sum of: 1) the model intercept of 1.80, 2) main effects of 1.04 points for being in the high SES group and –1.74 for being in the high general knowledge group, and 3) an interaction effect of –0.83 points. In contrast, high-SES children in the low achievement group show a mean gain of 5.2 points (effect size = 1.36 SD) during the same time period. Across all SES groups, children in the lowest general knowledge group demonstrated the largest summer gains in general knowledge, indicating that the general knowledge achievement gap between children with different spring kindergarten achievement

[8] Since exploratory regression analyses are used in this paper, significant coefficients for independent variables do not imply causal relationships with general knowledge achievement gains.

levels narrowed over the summer. Within each general knowledge group, children's gains varied by their SES level. For instance, in the middle achievement group, high-SES children gained 2.8 points (effect size = .73 SD) over the summer, compared to a 0.8 point gain (effect size = .21 SD) by low-SES children. The significant main effects for children's SES level on summer gains indicate that the general knowledge achievement gap for children from low- and high-SES families grew over the summer months, in contrast to the findings for spring kindergarten achievement status.

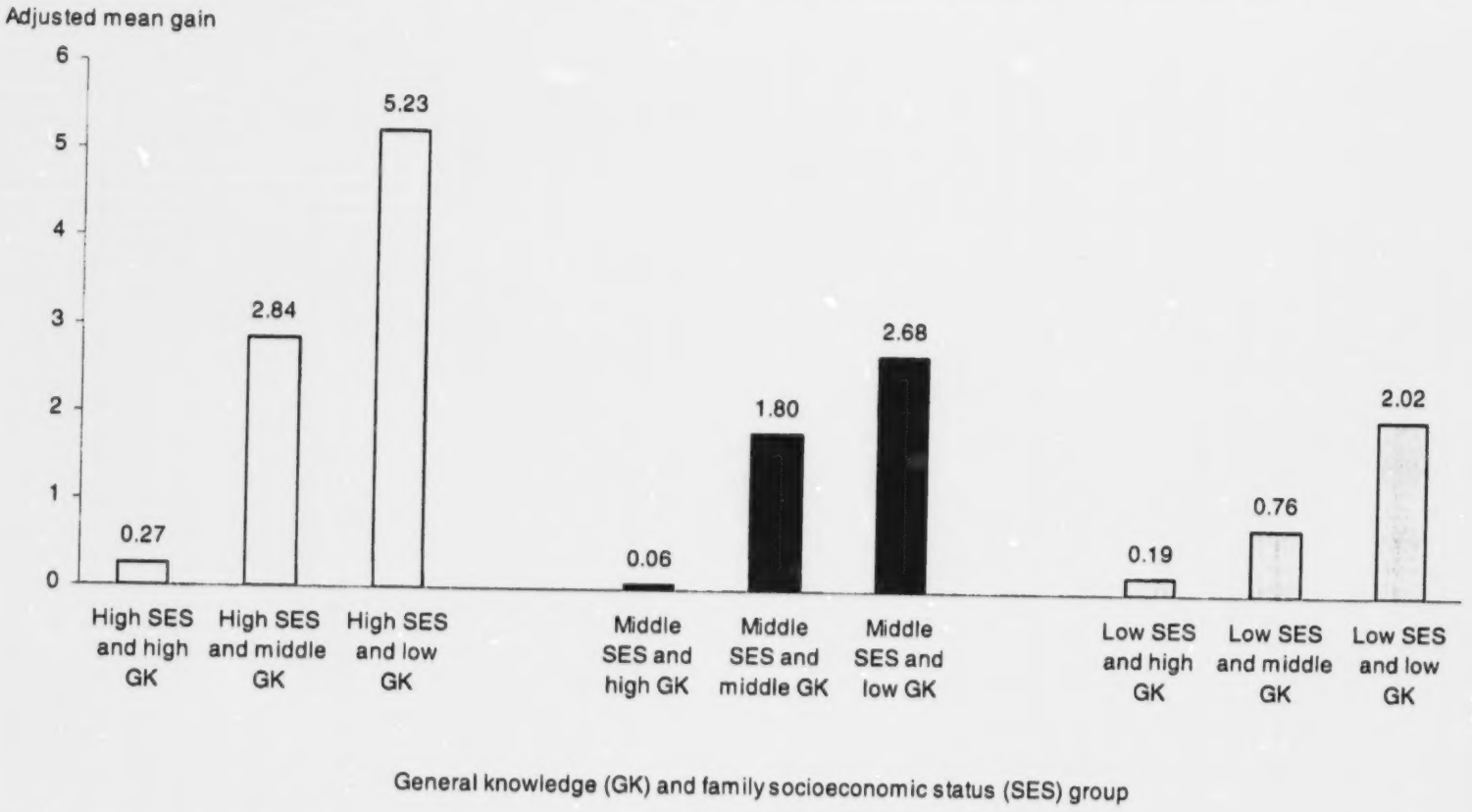
Based on these findings, children's general knowledge status at the beginning of first grade for each of the general knowledge achievement levels was compared within SES groups to explore whether low achievers in each SES group had closed the general knowledge achievement gap over the summer months. Although children with the lowest general knowledge performance made the greatest achievement gains over the summer, they still scored below their peers who had demonstrated greater general knowledge skills at the end of kindergarten (table 3). On average, children from the lowest achievement group went from a score of 18.8 points in the spring of kindergarten to a score of 23.0 points in the fall of first grade, while children from the highest general knowledge group had an average score of 36.3 points in the spring of kindergarten and 38.1 points in the fall of first grade. Gaps in general knowledge were also still detected for children within the different SES groups. For instance, high-SES children with low general knowledge achievement went from a score of 20.0 points to 26.9 points between the spring of kindergarten and fall of first grade, compared to the high achievement, high-SES group, which had scores of 37.4 and 39.4 points at the same time periods.

In summary, the results of the first set of analyses indicate that:

- Children, on average, made significant gains in general knowledge achievement over the summer, after accounting for the amount of time they were in and out of school;
- Children who repeated kindergarten in the 1999-2000 school year showed smaller gains in general knowledge over the summer than children who moved on to first grade;
- Children's general knowledge gains were related to their family SES and their general knowledge achievement status at the end of kindergarten;
- Children's general knowledge status in spring of kindergarten and their family SES interact in their relationship with children's summer gains in general knowledge, such that higher family SES and lower general knowledge status at the end of kindergarten were associated with greater summer gains.
- Although children with lower spring kindergarten general knowledge scores made greater gains in general knowledge over the summer, they still had lower general knowledge scores in the fall of first grade than their peers with higher spring kindergarten achievement, overall and within each SES group.

Based on these findings, potential summer influences on children's general knowledge gains were next examined.

Figure 2. First-time kindergartners' adjusted mean* general knowledge gains/losses from Spring 1999 to Fall 1999



*Mean gain scores are adjusted for children's sex, race/ethnicity, primary home language, and kindergarten retention status in the 1999-2000 school year, as well as the elapsed time between the assessments and the school year start/end dates.

NOTE: SES groups are: low SES (lowest 20%), middle SES (middle 60%) and high SES (highest 20%); General knowledge groups are three equally sized groups (low, middle, high) based on children's performance on the spring 1999 general knowledge assessment. Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall and Spring 1999.

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What activities do children participate in during the summer following kindergarten? Is participation in certain types of summer activities related to general knowledge gains over the summer?

The previous analyses showed that differences existed in children's general knowledge gains over the summer. It is important then to consider what activities and experiences children have during the summer, when school is not in session, which may foster achievement. Next, children's participation in summer activities is examined to determine the frequency of many resources and activities children may have available to them. Then, children's level of participation in certain types of activities is explored by key child and family characteristics. Finally, children's gains in general knowledge over the summer are investigated again, employing regression analyses, adding summer activity participation to the model.

Participation in summer activities

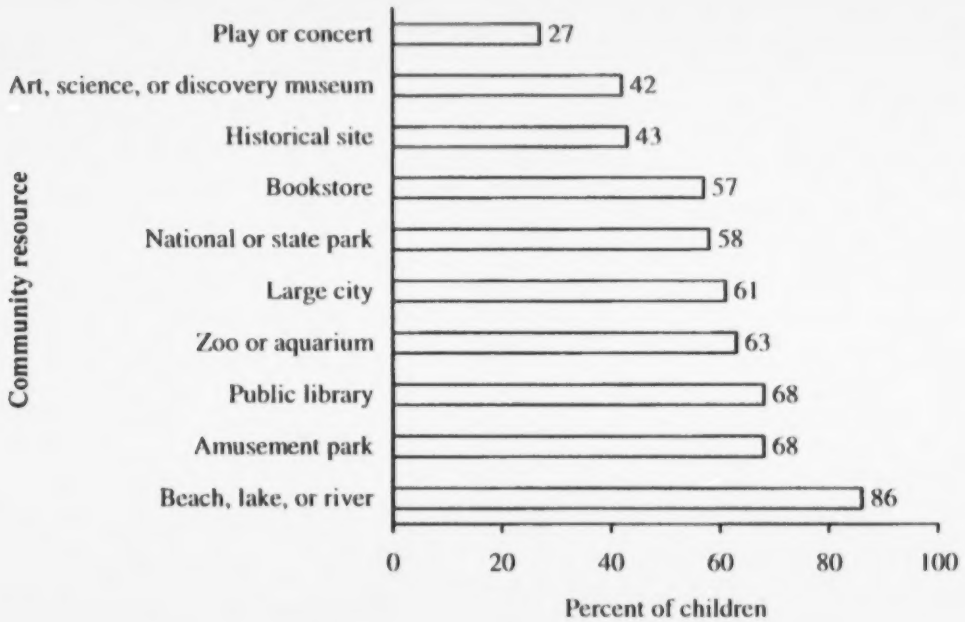
Children spend their time out of school in various ways. Common summer activities include going on vacations with family or relatives, visiting a library, going to a zoo, taking swimming lessons, and going to summer camp. This analysis considered a variety of activities and resources that children experienced or used during the summer between their kindergarten and first-grade years. Specifically, children's vacation experiences, use of community resources, participation in enrichment activities, and attendance in education programs were examined.

Most children took a summer vacation trip with their family or relatives between kindergarten and first grade (i.e., 80 percent). On average, children went on vacations for approximately 9 days during the summer break (including those children who did not go on a summer vacation at all). The number of days on family vacations ranged from 0 to 90 days.

While at home during the summer, children may have access to many community resources that could promote cognitive achievement by exposure to the world and people around them. Figure 3 shows the frequency of participation in a variety of community resources. The most frequently occurring activity in the summer was visiting a beach, lake, or river (86 percent). More than half of children visited a public library, went to a bookstore, visited a zoo or aquarium, went to an amusement park, visited a large city, and went to a national or state park during the summertime. About 40 percent of children visited a museum or went to a historical site. The community resource used least frequently was going to a play or concert, which less than one-third of children experienced during the summer.

Libraries and bookstores are resources found in the community that could promote cognitive achievement through access to books and reading materials. Exposure to these settings provides opportunities for children to read about or be read to about a broad range of topics, which may bolster their general knowledge. While visiting a library or bookstore was fairly common during the summer (68 and 57 percent, respectively), few children attended story hour sessions at these locations. In the summer following kindergarten, 16 percent of children attended a story hour at a library, and 5 percent went to a bookstore story hour. On average, children visited a bookstore about 2 times and a library about 4 times during the summer.

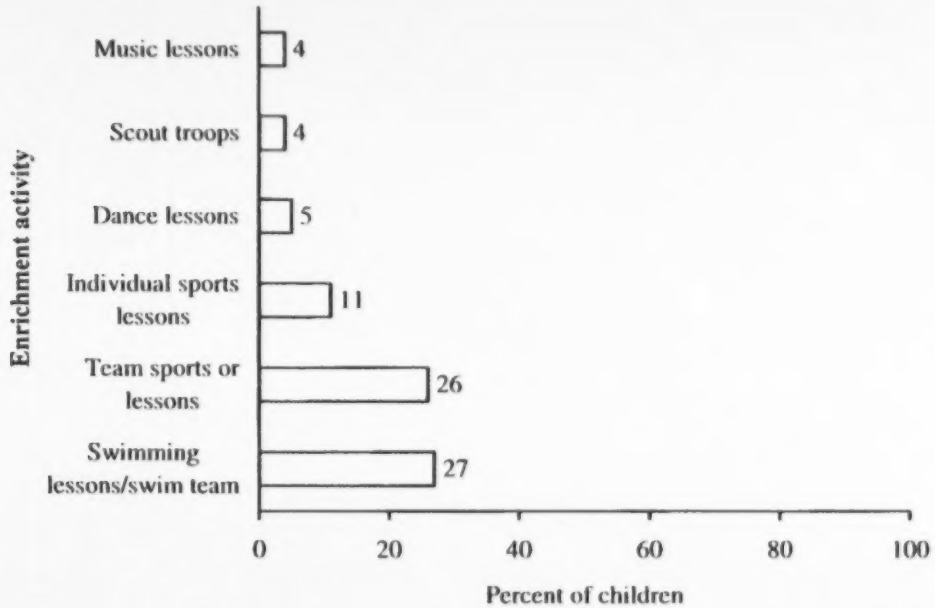
Figure 3. Percent of children using community resources in the summer following kindergarten: Summer 1999



NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1999.

In addition to the use of community resources, some children participated in organized summer enrichment activities such as music lessons and sports. These types of activities may provide more opportunities to interact with other peers and adults (e.g., sports and scout troops) as well as expose children to new ideas (e.g., the arts and other cultures). During the school year, these activities tend to be thought of as extracurricular, that is, enrichment in addition to that experienced in the home or school environment. During the summertime, children's participation in such activities tended to be limited (see figure 4). Approximately a quarter of all children took swimming lessons or participated in a team sport (27 and 26 percent, respectively). Also, some children participated in individual sports (11 percent). Music and dance lessons and membership in scout troops were rare activities during the summer for children (i.e., 4, 5, and 4 percent, respectively).

Figure 4. Percent of children participating in various enrichment activities in the summer following kindergarten: Summer 1999



NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1999.

Finally, some summer activities could be directly geared at promoting children's social and cognitive development, such as attendance in education programs through programs like summer school, summer camp, and day care. During the summer following kindergarten, 39 percent of children attended at least one early education program. Eleven percent of children went to summer school; 23 percent attended summer camp; and 10 percent were enrolled in day care centers (data not shown).

Level of participation in summer activities

Children's participation in any one activity per se may not directly impact their general knowledge achievement or cognitive development. Rather, it may be key to consider additive benefits of using several of these resources. The various resource activities described above were used to create indices by type (e.g., vacation time, use of community resources, enrichment experiences) to examine their relationships to gains in general knowledge. Five separate summer activity indices were created: 1) vacation experiences, 2) use of literacy resources, 3) use of other community resources, 4) enrichment activity participation, and 5) attendance in an education program, and were used in exploratory regression analyses to examine the relationships of each index with summer general knowledge gains after controlling for certain characteristics of children and their families.

Summer activity indices.

Vacation experiences

Summer vacation represents the opportunity for the child to experience a different setting and different people, outside of his or her neighborhood. To consider children's vacation experiences, the number of days spent on vacation was examined. Children who did not go on a summer vacation were assigned a value of 0 days on vacation. On average, children spent 9.4 days (SD=10.48) on a summer vacation or trip with their family or relatives between their kindergarten and first-grade years.

Use of literacy resources

In the previous section a visit to the library or bookstore was considered part of a child's utilization of a community resource. However, as additional information was collected on these resources (i.e., exact number of visits, whether attended a story hour), a literacy resource index was created that reflected the richness of use. The use of literacy resources index ranges from 0 to 3 points. Each child received 1 point for each of the following three components:

- visiting a library OR a bookstore
- attending a story hour at a library OR a bookstore
- visiting a library OR a bookstore greater than the average number of summer visits (i.e., 5 or more library visits OR 3 or more bookstore visits)

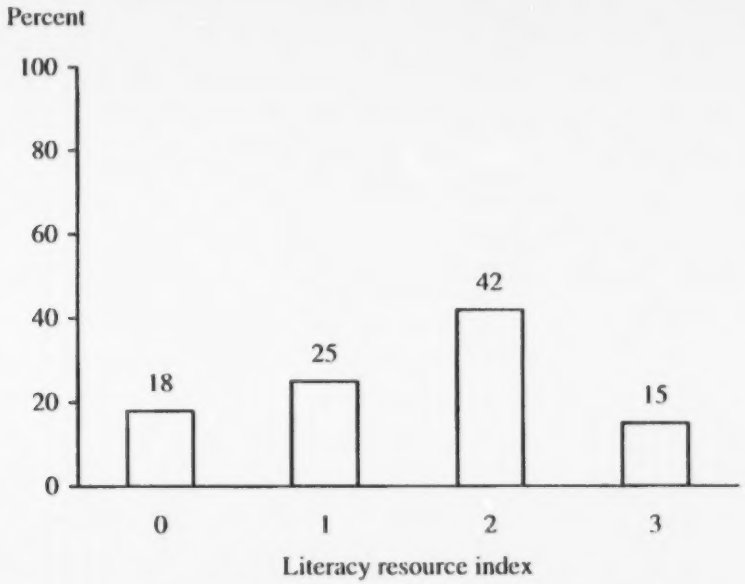
Considering these three components individually, 82 percent of children visited a library or bookstore; 19 percent of children attended a story hour at a library or bookstore; and 53 percent of children visited a library or bookstore for greater than the average number of visits.

Figure 5 shows the distribution of children on the literacy index. Children who did not visit a library or bookstore (and, therefore, did not attend a story hour or visit more than average) received a 0 on the index (18 percent). Children who visited a library or bookstore less than average but did not attend a story hour received a 1. Almost half of children (42 percent) received a 2 on the index, indicating that they either a) visited less than average and attended a story hour or b) visited more than average but did not attend a story hour. Those children receiving a 3 on the index visited a library or bookstore more than average and attended story hours. On average, children received a 1.5 on the literacy resource index (SD=0.95).

Use of other community resources

The eight remaining community resource activities (e.g., went to a zoo, visited a museum, went to an amusement park) were examined as a single index. Children received 1 point for each activity they experienced over the summer (range 0 to 8). Almost all children experienced at least 1 of the activities (98 percent). Fourteen percent of all children participated in 1 or 2 activities; 32 percent of children participated in 3 or 4 activities; 38 percent experienced 5 or 6 of them; and, 14 percent of children participated in 7 or 8 of the resources. The mean score on the community resource index was 4.5 (SD=1.85), indicating that on average children used at least 4 community resources over the summer.

Figure 5. Percentage distribution of children by frequency of literacy activities in the summer following kindergarten: Summer 1999



NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English. The literacy resource index estimates include those children who had data on all three literacy resource indicators: visited a library or bookstore, attended a story hour at a library or bookstore, and visited a library or bookstore greater than the mean number of visits.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1999.

Enrichment activity participation

To examine children's level of participation in enrichment activities, a count of the 6 activities (e.g., music lessons, team sports, scout troops) was taken. Children received 1 point for each enrichment activity they participated in over the summer. About half of children participated in at least 1 enrichment activity (52 percent). Thirty-two percent of all children participated in exactly 1 enrichment activity; 15 percent in 2 activities; and 5 percent of children participated in 3 or more enrichment activities. On average, children received a score of 0.8 (SD=0.92) on the enrichment activity participation index scale (range 0 to 6).

Summer education program attendance

Children's attendance in the three summer education programs was low to moderate (10 to 23 percent). The nature of the programs could be highly variable; thus, to examine children's level of participation in summer education programs, an index was created to represent whether a child attended any of these programs. Children received 1 point for attendance in summer school, summer camp, or day care during the summer (range 0 to 1). Forty percent of children experienced at least one summer education program.

Differences in summer activity participation. Children's participation in these 5 different types of summertime activities varied by several salient child and family characteristics such as children's race/ethnicity, their spring-kindergarten general knowledge status, and their family SES (table 4). All reported group differences are statistically significant at the .05 level, after Bonferroni adjustment for multiple comparisons, and are different by at least one-third of the index's standard deviation (or 5 percentage points for the education attendance index).

Vacation experiences

The mean number of days children spent on family vacations over the summer following kindergarten varied by their race/ethnicity, spring-kindergarten general knowledge status, and family SES. Black children spent fewer days on vacations than White children (approximately 7 versus 10 days). Children with the highest general knowledge skills at the end of kindergarten spent more days on vacations during the summer than children in the bottom or middle third (12 versus 8 and 9 days, respectively). Also, low-SES children spent significantly less time on summer vacations than other children. In addition, high-SES children went on family vacations for the most days (more than low- and middle-SES children) (14 days versus 6 and 9 days, respectively).

Use of literacy resources

Children's use of literacy resources also varied across race/ethnicity, spring-kindergarten general knowledge status, and family SES. The richness of children's use of these sources (i.e., visiting at least once, attending a story hour, visiting more than the average number of days) was significantly higher for White children than for Hispanic children. Children with low general knowledge status at the end of kindergarten had a lower literacy index score than children in the middle or top third (1.3 versus 1.6 and 1.8, respectively). Children from high-SES families had a significantly higher literacy index mean than children from other SES groups. And low-SES children also had a lower summer literacy resource index than middle-SES children.

Use of other community resources

Similar to literacy resources, children's use of other community resources varied by children's race/ethnicity, general knowledge status, and family SES. This index reflects the exact number of community resources (e.g., museum, play, national park) visited out of eight. White children used a significantly greater number of community resources over the summer than Black or Hispanic children (4.7 versus 3.9 and 4.1, respectively). In terms of prior general knowledge status, children in the bottom third used fewer resources than either children in the middle or top third of general knowledge (3.9 versus 4.5 and 5, respectively). Family SES was also related to differences in the use of community resources. Children from the lowest SES group used the fewest number of resources (3.4) while children from the highest SES group used the most resources (5.2).

Enrichment activity participation

On average, relatively few children participated in enrichment activities during the summer (mean of 0.8 activity out of 6 possible activities). Consistent with other summer experiences, children's participation varied by race/ethnicity, general knowledge status, and family SES. White children participated in more enrichment activities than Black or Hispanic children (0.9 versus 0.5 and 0.6, respectively). Asian/Pacific Islander children were also more likely to have participated in more enrichment activities than Black children (1.1 versus 0.5). In terms of prior

general knowledge status, children in the bottom third experienced fewer enrichment activities than either children in the middle or top third of general knowledge (0.5 versus 0.8 and 1, respectively). Family SES was also related to differences in enrichment participation. Low-SES children experienced fewer summer enrichment activities than middle- and high-SES children did (0.3 versus 0.7 and 1.2, respectively).

Summer education program attendance

Children's attendance in summer camps, summer school, or day care varied by their race/ethnicity, spring general knowledge status, 1999 kindergarten retention status, primary home language, and family SES. White and Black children were significantly more likely to attend an education program over the summer than Asian/Pacific Islander children (42 and 41 percent versus 28 percent). Children in the top third of general knowledge were more likely to attend summer education programs than children in the bottom or middle thirds. Also, children who were retained in kindergarten in 1999 were less likely to attend a summer education program than those who were promoted to first grade (30 percent versus 40 percent, respectively). Children whose primary home language is English were more likely to attend such programs (40 versus 28 percent). In addition, children from high-SES families were more likely to attend summer education programs than children from other SES groups (58 percent versus 25 percent of low SES and 36 percent of middle SES).

Summer activity and general knowledge gains

Results of the earlier exploratory regression analyses found a significant interaction between children's spring-kindergarten general knowledge status and SES in relation to their summer gains in general knowledge (see table 2). Descriptive analyses also indicated that children from different general knowledge status levels varied in their level of exposure to different summer activities (see table 4). Thus, a final set of exploratory regressions, which added the 5 summer activity indices to the second model in the previous regression analyses as predictors of children's general knowledge gains over the summer, were run separately for each spring-kindergarten general knowledge status level. The characteristics of children in each of these groups are provided in table 5. By examining the model separately for children from each general knowledge achievement status level, it is possible to identify which factors are related to gains for children at different points of the achievement spectrum.

For the first model (low general knowledge group), 2 of the 5 summer activity indices were found to be positively related to children's summer gains in general knowledge (table 6, column 1). Children who had attended at least one summer educational program, such as summer school, camp, or day care, had a significant increase of about a half of a point in general knowledge over the summer (effect size = 0.12 SD). Also, for each point increase on the literacy resource index, children showed a gain of 0.31 points in general knowledge for the same time period (effect size = 0.08 SD). However, the regression models for the middle and high general knowledge groups did not show significant relationships between any of the 5 summer activity indices and general knowledge gains over the summer.

For the low and middle achievement group models, children from the high-SES group demonstrated larger summer gains than children from middle-SES backgrounds (table 6, columns 2 and 3). Children in the low spring-kindergarten general knowledge group from high-SES families gained 2.17 points more in the summer than their peers from middle-SES families (effect size = 0.64 SD). For those in the middle general knowledge group, high-SES children gained 0.91 points more than middle-SES children (effect size = .24 SD). Being in the low-SES group was

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not related to summer gains for the low general knowledge group; however, it was negatively related to summer gains for the middle achievement group (loss of 0.98 points compared to middle-SES group, effect size = 0.26 SD). In the low and high achievement groups, children who were retained in kindergarten in the 1999-2000 year had significantly lower gains over the summer (-1.41 points, effect size = 0.37 SD for the low group; -1.15 points, effect size =0.30 SD for the high group), while retention status was not significantly related to summer gains for children from the middle achievement group. Also, boys in the middle achievement group averaged 0.58 points more in summer general knowledge gains than girls (effect size = 0.15 SD), a finding that was not replicated in the low or high general knowledge group model.

Conclusion

The results of this study indicate that overall children make gains rather than lose ground in general knowledge skills and knowledge over the summer following their first year of kindergarten. Certain groups of children demonstrated larger gains in general knowledge over the summer than others. For instance, boys, children from high-SES families, and those who were promoted to first grade made larger gains over the summer than girls, children from low-SES families, and those who were retained for a second year of kindergarten. Summer gains did not differ, however, by children's race/ethnicity or their primary home language, after controlling for other factors. Also, within SES groups, children who performed in the lowest third on the spring-kindergarten general knowledge assessment demonstrated the greatest progress in the summertime, while those performing in the highest third showed the smallest summer gains. However, although children from the lowest general knowledge group made the greatest gains over the summer following kindergarten, working to close the achievement gap, they still did not reach the spring-kindergarten achievement status of their peers in the middle and high achievement groups.

By including the three time periods between the spring kindergarten and fall-first grade assessments in our regression analyses, the results of the initial models indicated that the amount of days children were "in-school" between the two assessments was significantly related to general knowledge gains, while the amount of days of "out-of-school" time was not. This finding is important because it identifies that school matters in children's general knowledge development. The ECLS-K assessments were designed to reflect what children are taught in school; thus, it is expected that the amount of days spent in school after the spring-kindergarten assessments and before the fall-first grade assessments would be positively related to general knowledge gains between the two assessments.

This study also found that children experienced a variety of activities in the summer following their kindergarten year, including going on summer trips, using community resources, attending summer educational programs, and participating in enrichment activities. However, children's level of involvement in different types of summer experiences differed by several characteristics. For instance, White children and those from the high-SES group had higher levels of involvement in all types of summer activities than some minority children and those from the lowest SES group. Also, children at the lowest general knowledge achievement status level in spring of kindergarten had less exposure to summer activities than children from the middle and high achievement levels.

Looking more specifically at summer gains for children in terms of their spring-kindergarten general knowledge status, this research found that, on average, associations between summer experiences and general knowledge gains were only detected for children from the lowest performing general knowledge group after controlling for other factors in the model. For this

group of children, greater exposure to literacy activities, such as visiting a library or bookstore often and attending story hours at these locations, was related to additional summer gains in general knowledge. In addition, children from the low general knowledge group who participated in summer school, camps, or day care gained almost a half-point more in general knowledge than their peers who did not attend any summer education programs. For children from the middle and high general knowledge groups, who experienced the summer activities examined here more often, such experiences were not associated with summer general knowledge gains.

The findings from this paper indicate the need to explore further the potential benefit of summer literacy resources and education programs for young children, especially those with lower general knowledge status at the end of kindergarten. This is especially important given the fact that children in the lowest achievement group are the least likely to participate in these types of summer activities and programs that have the potential to increase children's general knowledge learning when school is not in session. Future studies should also examine other characteristics of young children, such as their age at kindergarten entry, attendance in preschool programs, and participation in other summer experiences (e.g., home computer use, tutoring), to see if other factors might be associated with the gains children make in general knowledge in the summer after kindergarten.

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Table 1. Percentage distribution of first-time kindergartners in the full ECLS-K sample and in the sample used for this analysis, by various child and family characteristics: Spring 1999

Selected child and family characteristics	Percent	
	Full ECLS-K sample[1] (n=17,219)	Analysis subsample[2] (n=3,718)
All kindergartners	100	100
Child's sex		
Male	51	50
Female	49	50
Child's race/ethnicity		
White, non-Hispanic	58	65
Black, non-Hispanic	16	15
Hispanic	19	13
Asian/Pacific Islander	3	3
Other, non-Hispanic	4	4
Primary home language		
English	89	94
Non-English language	11	6
Family socioeconomic status (SES)		
Low SES (lowest 20%)	19	15
Middle SES (middle 20%)	60	62
High SES (highest 20%)	21	23

[1]Estimates in this column are weighted by BYPW0, the longitudinal parent full-sample weight for base year data.
[2]Estimates in this column are weighted by C23CW0, the longitudinal child full-sample weight for spring 1999 and fall 1999 data and only include children who were administered general knowledge assessments in English for both data collection rounds.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1998, Spring 1999 and Fall 1999.

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Table 2. Regression of general knowledge gains on children's sex, race/ethnicity, family socioeconomic status, school urbanicity, primary home language, kindergarten retention status, elapsed time periods, and spring-kindergarten general knowledge status: Spring 1999 and fall 1999

Selected child and family characteristics	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient
Intercept	1.31*	0.94*	1.80*
Male		0.24	0.35*
Race/ethnicity			
Black, non-Hispanic		0.52	-0.35
Hispanic		0.02	-0.43
Asian/Pacific Islander		0.58	-0.26
Other, non-Hispanic		0.01	-0.58
Family socioeconomic status (SES)			
Low SES (lowest 20%)		-0.22	-1.04*
High SES (highest 20%)		0.20	1.04*
School urbanicity			
Urban fringe and large town		-0.02	-0.19
Small town and rural		-0.01	-0.19
Primary home language other than English		0.18	-0.39
Repeated kindergarten in 1999-2000		-0.83*	-1.31*
Elapsed time variables, in days			
Spring assessment to end of kindergarten	0.02*	0.02*	0.02*
End of kindergarten to start of first grade (centered on mean of 79.6 days)	#	#	0.01
Start of first grade to Fall assessment	0.03*	0.03*	0.02*
Spring-kindergarten general knowledge (GK) IRT-scale score			
Low GK group (lowest third)			0.88*
High GK group (highest third)			-1.74*
Interaction of SES and spring GK score			
High GK group * High SES group			-0.83*
High GK group * Low SES group			1.17
Low GK group * High SES group			1.51*
Low GK group * Low SES group			0.38

* $p<0.05$

Rounds to zero.

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Spring 1999 and Fall 1999.

Table 3. Mean general knowledge IRT-scale scores in the spring of kindergarten and fall of first grade, by children's socioeconomic status (SES) and spring kindergarten general knowledge (GK) achievement status: Spring 1999 and fall 1999

Child's socioeconomic status (SES) and spring general knowledge (GK) achievement status	Mean general knowledge IRT-scale score	
	Spring kindergarten	Fall first grade
SES level		
Low SES group (lowest 20%)	21.1	24.2
Middle SES group (middle 60%)	27.6	30.8
High SES group (highest 20%)	32.7	36.0
Spring GK achievement status		
Low GK group (lowest third)	18.8	23.0
Middle GK group (middle third)	28.1	31.7
High GK group (highest third)	36.3	38.2
GK achievement status within SES levels		
Low SES group		
Low GK group	17.4	20.8
Middle GK group	27.8	30.3
High GK group	34.0	35.8
Middle SES group		
Low GK group	19.3	23.5
Middle GK group	28.1	31.6
High GK group	35.6	37.4
High SES group		
Low GK group	20.0	26.9
Middle GK group	28.5	32.8
High GK group	37.4	39.4

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1998, Spring 1999 and Fall 1999.

Table 3a. Standard errors for the mean general knowledge IRT-scale scores in the spring of kindergarten and fall of first grade, by children's socioeconomic status (SES) and spring kindergarten general knowledge (GK) achievement status: Spring 1999 and fall 1999

Child's socioeconomic status (SES) and spring general knowledge (GK) achievement status	Mean general knowledge IRT-scale score	
	Spring kindergarten	Fall first grade
SES level		
Low SES group (lowest 20%)	0.43	0.40
Middle SES group (middle 60%)	0.29	0.33
High SES group (highest 20%)	0.45	0.39
Spring GK achievement status		
Low GK group (lowest third)	0.15	0.24
Middle GK group (middle third)	0.05	0.20
High GK group (highest third)	0.17	0.20
GK achievement status within SES levels		
Low SES group		
Low GK group	0.22	0.29
Middle GK group	0.14	0.42
High GK group	0.38	0.55
Middle SES group		
Low GK group	0.22	0.32
Middle GK group	0.05	0.27
High GK group	0.15	0.19
High SES group		
Low GK group	0.34	0.52
Middle GK group	0.13	0.28
High GK group	0.25	0.28

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1998, Spring 1999 and Fall 1999.

Table 4. Children's mean participation rates in various out-of-school activities in the summer following kindergarten: Summer 1999

Selected child and family characteristics	Mean days on vacation trip	Literacy resources	Mean number of other community resources (0-8)	Attendance at early education programs	Mean number of enrichment activities (0-6)
Total	9.4	1.5	4.5	39	0.8
Child's sex					
Male	9.4	1.5	4.5	41	0.8
Female	9.5	1.6	4.4	38	0.8
Child's race/ethnicity					
White, non-Hispanic	10.3	1.6	4.7	42	0.9
Black, non-Hispanic	6.8	1.4	3.9	41	0.5
Hispanic	9.2	1.3	4.1	33	0.6
Asian/Pacific Islander	9.5	1.6	4.2	28	1.1
Other, non-Hispanic	6.4	1.2	3.9	32	0.5
Child's spring general knowledge (GK) IRT-scale score					
Low GK group (lowest third)	7.5	1.3	3.9	33	0.5
Middle GK group (middle third)	8.9	1.6	4.5	36	0.8
High GK group (highest third)	11.9	1.8	5.0	49	1.0
Child's kindergarten retention status in 1999-2000 school year					
Child retained in kindergarten	8.3	1.6	4.0	30	0.6
Child promoted to first grade	9.5	1.5	4.5	40	0.8
Primary home language					
English	9.4	1.6	4.5	40	0.8
Non-English language	9.6	1.4	4.1	28	0.6
Family socioeconomic status (SES)					
Low SES (lowest 20%)	5.5	1.0	3.4	25	0.3
Middle SES (middle 60%)	8.8	1.5	4.5	36	0.7
High SES (highest 20%)	13.7	1.9	5.2	58	1.2
School urbanicity					
Central city	9.3	1.5	4.3	40	0.7
Urban fringe and large town	9.8	1.7	4.7	43	0.8
Small town and rural	8.9	1.5	4.4	33	0.8

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1999.

Table 4a. Standard errors of children's mean participation rates in various out-of-school activities in the summer following kindergarten: Summer 1999

Selected child and family characteristics	Mean days on vacation trip	Literacy resources	Mean number of other community resources (0-8)	Attendance at early education programs	Mean number of enrichment activities (0-6)
Total	0.34	0.03	0.06	1.89	0.03
Child's sex					
Male	0.40	0.04	0.08	1.52	0.04
Female	0.40	0.03	0.08	1.52	0.04
Child's race/ethnicity					
White, non-Hispanic	0.41	0.03	0.07	2.14	0.03
Black, non-Hispanic	0.42	0.05	0.10	2.93	0.06
Hispanic	1.03	0.07	0.17	3.38	0.06
Asian/Pacific Islander	1.24	0.15	0.18	3.34	0.18
Other, non-Hispanic	0.57	0.25	0.31	9.70	0.12
Child's spring general knowledge (GK) IRT-scale score					
Low GK group (lowest third)	0.53	0.03	0.11	2.02	0.04
Middle GK group (middle third)	0.43	0.04	0.08	2.39	0.04
High GK group (highest third)	0.45	0.03	0.07	2.52	0.03
Child's kindergarten retention status in 1999-2000 school year					
Child retained in kindergarten	1.06	0.17	0.29	3.74	0.08
Child promoted to first grade	0.35	0.03	0.06	1.88	0.03
Primary home language					
English	0.33	0.03	0.07	1.93	0.03
Non-English language	1.49	0.11	0.20	3.27	0.07
Family socioeconomic status (SES)					
Low SES (lowest 20%)	0.66	0.05	0.14	3.99	0.04
Middle SES (middle 60%)	0.34	0.03	0.07	1.67	0.04
High SES (highest 20%)	0.52	0.03	0.07	3.07	0.05
School urbanicity					
Central city	0.49	0.04	0.10	2.10	0.04
Urban fringe and large town	0.50	0.04	0.09	2.40	0.04
Small town and rural	0.78	0.08	0.12	4.39	0.07

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Fall 1999.

Table 5. Percent of ECLS-K children with various characteristics, by children's spring-kindergarten general knowledge status: Spring and fall 1999

Selected child and family characteristics	Spring kindergarten general knowledge status		
	Lowest third (range=7.9 – 24.4)	Middle third (range=24.4 – 31.6)	Highest third (range=31.6 – 47.4)
Total	100	100	100
Child's sex			
Male	49	48	54
Female	51	52	46
Child's race/ethnicity			
White, non-Hispanic	40	72	82
Black, non-Hispanic	30	10	6
Hispanic	19	12	8
Asian/Pacific Islander	5	2	2
Other, non-Hispanic	6	4	2
Family socioeconomic status (SES)			
Low SES (lowest 20%)	31	12	3
Middle SES (middle 60%)	61	69	56
High SES (highest 20%)	9	19	41
Child retained in kindergarten in 1999–2000			
Yes	8	3	3
No	92	97	97
Primary home language is English			
Yes	88	96	98
No	12	4	2
School urbanicity			
Central city	43	29	37
Urban fringe and large town	34	46	41
Small town and rural	24	25	21

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Spring 1999 and Fall 1999.

Table 6. Regression of general knowledge gains on children's sex, race/ethnicity, family SES, school urbanicity, primary home language, kindergarten retention status, summer activity indices, and elapsed time periods, by children's spring-kindergarten general knowledge status: Spring 1999 and fall 1999

Selected child and family characteristics	Spring-kindergarten general knowledge status		
	Model 1 (lowest third) Coefficient	Model 2 (middle third) Coefficient	Model 3 (highest third) Coefficient
Intercept	1.84*	0.55	0.91
Male	0.27	0.58*	0.24
Race/ethnicity			
Black, non-Hispanic	-0.25	-0.63	-0.19
Hispanic	-0.36	-0.52	-0.30
Asian/Pacific Islander	-0.70	0.23	0.64
Other, non-Hispanic	-0.91	0.46	0.03
Family socioeconomic status (SES)			
Low SES (lowest 20%)	-0.38	-0.98*	0.01
High SES (highest 20%)	2.17*	0.91*	0.27
School urbanicity			
Urban fringe and large town	0.04	-0.25	-0.20
Small town and rural	-0.05	-0.38	0.11
Primary home language other than English	-0.36	-1.30	0.54
Repeated kindergarten in 1999-2000	-1.41*	-0.91	-1.15*
Summer activity indices			
Number of days on vacation	0.02	0.02	#
Literacy resource index	0.31*	0.13	0.04
Other community resources	0.11	0.04	-0.05
Summer education program attendance	0.46*	-0.05	0.18
Participation in enrichment activities	-0.13	-0.04	-0.09
Elapsed time variables, in days			
Spring assessment to end of kindergarten	0.04*	0.02	0.01
End of kindergarten to start of first grade (centered on mean of 79.6 days)	-0.02	0.03*	#
Start of first grade to Fall assessment	0.01	0.04*	0.02*

* $p<0.05$.

Rounds to zero.

NOTE: Estimates are based on children who were first-time kindergartners in the 1998-99 school year and were assessed in English.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Spring 1999 and Fall 1999.

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